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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/426,644

10/25/1999

JAE-HO MOON

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2168

21171

7590

07/30/2002

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EXAMINER

TUGBANG, ANTHONY D

ART UNIT

PAPER NUMBER

3729

DATE MAILED: 07/30/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/426,644

Applicant(s)

MOON ET AL.

Examiner

Dexter Tugbang

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 May 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 13-17,19,21,23,24,27,30,31,38,40,42,44,45 and 47 is/are pending in the application.
- 4a) Of the above claim(s) 31,44,45,47 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 13-16,21,24,27,30 and 42 is/are allowed.
- 6) ☒ Claim(s) 1,2,17,19,23,38 and 40 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 18.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The applicants' amendment filed 5/9/02 (Paper No. 19) has been fully considered and made of record.
2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Election/Restrictions

3. This application contains claims directed to the following patentably distinct species of the claimed invention:

Species A drawn to Claims 1, 2, 13-17, 19, 21, 23, 24 27, 30, 38, 40 and 42; and

Species B drawn to Claims 31, 44, 45 and 47.

Species A does not require the specifics of second chambers as required by Species B.

Species B does not require the specifics of any spinning process as require by Species A.

Applicant is required under 35 U.S.C. 121 to elect a single disclosed species for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable. Currently, no claims are generic.

Applicant is advised that a reply to this requirement must include an identification of the species that is elected consonant with this requirement, and a listing of all claims readable thereon, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which are written in dependent form or otherwise include all the limitations of an allowed generic claim as provided by 37 CFR 1.141. If claims are added after the election, applicant must indicate which are readable upon the elected species. MPEP § 809.02(a).

Should applicant traverse on the ground that the species are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

4. Pending Claims 31, 44, 45 and 47 are directed to an invention that is independent or distinct and mutually exclusive from the invention originally claimed for the reasons set forth above.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, Claims 31, 44, 45 and 47 have been withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Claim Objections

5. Claim 1 is objected to because of the following informalities: the term "heating" (line 10) should be replaced with --heat--. Appropriate correction is required.

Claim Rejections - 35 USC § 103

6. Claims 1, 2 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Campanelli 4,878,992 and Hawkins et al Re. 32,572 (referred to hereinafter as Hawkins'572) in view of Hawkins et al 5,006,202 (referred to hereinafter as Hawkins'202).

Regarding Claim 1, Campanelli discloses the claimed manufacturing method comprising: forming a nozzle part (channel plate 31); adhering a membrane (polymer layer 58) to the formed nozzle part 31 and a heat driving part (heating element wafer 36) to form the fluid jetting apparatuses as a wafer (shown in Fig. 1), which will eventually be separated into individual fluid jetting apparatuses. Insofar as understood, the wafer (shown in Fig. 1) of Campanelli comprising the membrane 58, nozzle part 31 and heat driving part 36 are considered to be a shape of an undivided wafer to the extent that they are integrally attached to one another prior to being split by the dicing blade 20. The heat driving part 36 includes fluid chambers (through hole 35) and the membrane 58 surrounds or separates the fluid chambers 35 of the heat driving part from the nozzle part 31 (shown in Figures 5 and 6).

NOTE: Hawkins'572 is incorporated by reference within the disclosure of Campanelli (see Campanelli at col. 4, lines 65-67).

Regarding Claim 2, Hawkins'572 teaches forming electrodes 33 and heating elements 34 on a first substrate of a silicon wafer 36 (shown in Fig. 5); and forming driving fluid barriers (upper substrate 31) on top of the electrodes 33 and the heating elements 34.

Regarding Claim 38, Campanelli further teaches splitting of the nozzle part, heat driving part and membrane, assembled together in the form of the wafer (shown in Fig. 2) by a dicing blade 20 (shown in Fig. 3) to form separate fluid jetting apparatuses.

Neither Campanelli nor Hawkins'572 teaches forming the nozzle part by a spinning process.

Hawkins'202 teaches forming a nozzle part (channel plate 12 in Fig. 16) by a spinning process of spin coating layers of photoresists to etch and shape the nozzle part (see col. 6, lines 12-42). The benefits of such a spinning process leaves a precision, etched nozzle part ready to be separated into multiple fluid jetting apparatuses (see col. 3, lines 65-68).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have formed the nozzle part of either Campanelli or Hawkins'572 by the spinning process of Hawkins'202, to positively provide a precision, etched nozzle part ready to be separated into multiple fluid jetting apparatuses.

7. Claims 17 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Leban 5,229,785 in view of Baise et al 4,371,565.

Regarding Claim 17, Leban discloses the claimed manufacturing method for a plurality of fluid jetting apparatuses comprising: forming a nozzle part on a wafer (dummy substrate 10); adhering the nozzle part with the wafer to a membrane (layer 12); removing the wafer 10 from the nozzle part (see Fig. 1H); and adhering the membrane 12 with the adhered nozzle part (shown in Fig. 1G) to a heat driving part (heater element 36 and substrate 34) to form the fluid jetting apparatuses (see col. 7, lines 43-48). The nozzle part, membrane and heat driving part are formed as an undivided unit (as shown in either one of Figures 1H, 2B or 4).

Regarding Claim 19, Leban further teaches the following: forming a nozzle plate 14 on a first substrate 34 in which both of the elements constitute the nozzle part; forming jetting fluid barriers (layer 22) on the nozzle plate; forming jetting fluid chambers 32 within the jetting fluid

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barriers; forming a first reinforcement element (additional layer 52 shown in the embodiment of Fig. 3C); and forming nozzles 20 in the nozzle plate. The claimed "spinning process" of Leban is broadly encompassed by the nozzle plate 14 of the nozzle part being formed by a coating technique of *spinning* or spraying (discussed at col. 4, lines 56-61) together with the fluid jetting barriers 22 being formed by etching (discussed at col. 5, lines 33-39).

Leban does not teach that the wafer is made of the material of silicon.

Baise teaches that it is known in the art of spinning processes, i.e. spin coatings, to form polymeric layers on a substrate wafer made of silicon material (see col. 1, lines 49-53). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have formed the nozzle part material of Leban on a substrate wafer made of silicon material, as taught by Baise, for the purpose of performing an equivalent spinning process of spin coating.

8. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Leban in view of Baise, as applied to Claim 17 above, and further in view of Pan 4,894,664.

Leban, as modified by Baise, discloses the claimed manufacturing method as previously discussed including the step of forming electrodes (electrical conductors) and heat elements (heat resistors 36) on a substrate wafer 34 (see col. 5, line 60 to col. 6, line 5 of Leban). The modified Leban method does not teach that the substrate wafer is made of *silicon* material as well as the steps of forming driving fluid barriers on the electrodes and the heat elements, and forming driving fluid chambers in the driving fluid barriers.

Pan teaches a process of manufacturing a thermal fluid jetting apparatus of forming a heat driving part (substrates 40, 10) in which driving fluid barriers (beams 12) are formed on both electrodes (conductive layers 23, 27) and heat driving elements (resistive layers 15). The driving

fluid chambers are read as the passageways in-between the driving fluid barriers (beams 12 shown in Fig. 3). The benefits of such a process above provides a fluid jetting apparatus with increased reliability with a longer life of heat driving elements and smoother ink flow (see col. 1, lines 48-52).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have improved the heat driving part of the modified Leban method by including the process of forming driving fluid barriers and driving fluid chambers, as taught by Pan, to positively provide an overall fluid jetting apparatus having increased reliability with a longer life of heat driving elements and smoother ink flow.

9. Claim 40 is rejected under 35 U.S.C. 103(a) as being unpatentable over Leban in view of Baise, as applied to claim 17 above, and further in view of Campanelli.

Leban, as modified by Pan, teaches the claimed manufacturing method as previously discussed including the suggestion of forming a plurality of fluid jetting apparatuses (at col. 7, lines 43-48 of Leban). The modified Leban method does not teach splitting the adhered nozzle part, membrane, and heat driving part into separate fluid jetting apparatuses.

Campanelli, as relied upon above, teaches batch fabrication of a plurality fluid jetting apparatuses in which each fluid jetting apparatus is formed into a continuous wafer or continuous piece. Subsequently, Campanelli splits the continuous wafer or continuous piece into a plurality of fluid jetting apparatuses by utilizing a dicing blade to ultimately provide an inexpensive manufacturing process for creating high quality fluid jetting apparatuses (see col. 9, lines 8-12).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have improved the modified Leban method by batch fabrication of the fluid jetting

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apparatuses, as taught by Campanelli, to positively provide an inexpensive manufacturing process for creating high quality fluid jetting apparatuses.

Response to Arguments

10. Applicant's arguments filed 5/9/02 (Paper No. 19) have been fully considered but they are not persuasive.

In regards to the merits of Campanelli and Hawkins as applied to the rejection of Claim 1, applicants allege that neither teach adhering a membrane to the formed nozzle part and heat driving part where the heat driving part includes fluid chambers and the membrane separates the fluid chambers of the heat driving part from the nozzle part.

The examiner most respectfully disagrees and points to Campanelli's Figures 5 and 6. Here, it is clearly shown that the membrane 58 is adhered to the nozzle part 31 and the heat driving part 36 with the heat driving part including fluid chambers (through-holes 35). The membrane 58 surrounds the fluid chambers 35 to separate the fluid chambers from the portion of the heat driving part 36 that has the heating elements 34. Whether or not an actual space exists between the heating element substrate 36 and the polymer layer 58 is insignificant because rejected Claims 1, 2 and 38 do not claim any such "space" and it appears that the applicants are arguing more specifically than that which is claimed. Limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

In regards to the merits of Leban as applied to the rejection of Claims 17, 19, 23 and 40, applicants contend that Leban does not teach adhering the nozzle part with the silicon wafer to a membrane and adhering the membrane with the adhered nozzle part to a heat driving part.

The examiner most respectfully disagrees and points to Leban's Figure 1G. Here, it is shown that the nozzle part is adhered to the membrane 12 and the heat driving part 34, 36. The claims do not preclude that any additional layers, i.e. layer 22, can exist between the membrane (photoresist 12) and the heat driving part (substrate 34 and heater 36). Clearly in Figure 1G, all of the layers 10, 12, 14, 22, 36, 34 are adhered together. Whether or not the photoresist 12 directly contacts the substrate 34 is insignificant because the feature of adhering the membrane with the nozzle part and the heat driving part such that there are all in "direct contact" is not claimed and again, it appears that the applicants are arguing more specifically than that which is claimed.

In regards to the merits of Pan, applicants contend that Pan does not teach that the electrodes and heating elements are formed on the bottom sides of the corresponding driving fluid chambers. The examiner traverses in that the claims do not recite any relationship between bottom sides and top sides, or do even recite top sides. Thus, the location of the heating elements and electrodes of Pan can be said to be on the claimed "bottom sides of the corresponding driving fluid chambers". Alternatively, by taking the Figures of either Pan or Leban and turning each of these Figures upside down, the heating elements and electrodes can also be said to be on the claimed "bottom sides of the corresponding driving fluid chambers". The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re*

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Keller, 642 F.2d 413, 208 USPQ 871 (CCPA 1981). Therefore, the combination of Pan with Leban and Baise satisfies the limitations of Claim 23.

Allowable Subject Matter

11. Claims 13-16, 21, 24, 27, 30 and 42 are allowed.

Conclusion

12. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dexter Tugbang whose telephone number is 703-308-7599. The examiner can normally be reached on Monday - Friday 9:00 am - 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Peter Vo can be reached on 703-308-1789. The fax phone numbers for the

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organization where this application or proceeding is assigned are 703-305-3590 for regular communications and 703-305-3588 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0858.

adt
July 25, 2002

A handwritten signature in black ink, consisting of a series of loops and a long horizontal stroke, positioned above the printed name and title.

**PETER VO
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 3700**